

We claim:

- Sub B' 1. A motor vehicle window construction comprising, in combination:
- 2 frame means for mounting in a window recess in the vehicle body comprising
- 3 a circumferential frame member;
- 4 a slider subassembly comprising a transparent pane and being slidably mounted
- 5 in the frame means for sliding laterally back and forth between a full open position and
- 6 a closed position; and
- 7 a pull-pull cable drive subassembly for moving the slider subassembly laterally
- 8 back and forth between its full open and closed positions, the pull-pull cable drive
- 9 subassembly comprising:
- 10 drive apparatus mounted to the vehicle body remote from the
- 11 circumferential frame member, comprising a drive motor having an
- 12 output member and a drive drum operatively engaging the output
- 13 member for rotation upon actuation of the drive motor; and
- 14 drive cable attached to the slider subassembly and wrapped
- 15 around the drive drum for pulling the slider subassembly substantially
- 16 laterally in a first direction toward its full open position upon rotation
- 17 of the drive drum in a first rotational direction, and for pulling the slider
- 18 subassembly substantially laterally in a second direction toward its
- 19 closed position upon rotation of the drive drum in an opposite rotational
- 20 direction, the slider subassembly and drive cable together forming a
- 21 closed loop from the drive drum, with a first drive cable segment
- 22 extending laterally from the slider subassembly toward a left side of the

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frame member and a second drive cable segment extending laterally

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from the slider subassembly toward a right side of the frame member.

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2. The motor vehicle window construction in accordance with claim 1 wherein at least a

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section of the first drive cable segment extends in a first cable channel in a substantially

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horizontal lower portion of the frame member, and at least a section of the second drive cable

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segment extends in a second cable channel in the lower portion of the frame member.

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3. The motor vehicle window construction in accordance with claim 2 wherein at least a

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portion of the first and second channels has a closed cross-sectional configuration.

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4. A multi-pane window construction for a motor vehicle, the window construction

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comprising, in combination:

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frame means for mounting in a window opening of a motor vehicle body,

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comprising a circumferential frame member having substantially vertical right and left

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portions interconnected by substantially horizontal upper and lower portions;

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at least one fixed-position pane mounted in the frame means;

7

a slider subassembly comprising a transparent pane and being slidably mounted

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in the frame means for sliding laterally between a full open position and a closed

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position; and

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a pull-pull cable drive subassembly for moving the slider subassembly laterally

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back and forth between its full open position and closed position, the pull-pull cable

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drive subassembly comprising:

13 drive apparatus mounted to the motor vehicle body remote from  
14 the circumferential frame member, comprising a drive motor having an  
15 output member and a drive drum operatively engaging the output  
16 member for rotation upon actuation of the drive motor; and

17 drive cable wrapped around the drive drum and having a first  
18 end attached to the slider subassembly at a first location and a second  
19 end attached to the slider subassembly at a second location remote from  
20 the first location, for pulling the slider subassembly substantially  
21 laterally in a first direction toward its full open position upon rotation  
22 of the drive drum in a first rotational direction and for pulling the slider  
23 subassembly substantially laterally in a second direction toward its  
24 closed position upon rotation of the drive drum in an opposite rotational  
25 direction, the slider subassembly and drive cable together forming a  
26 closed loop from the drive drum, with at least a first drive cable  
27 segment which extends from the drive drum to the slider subassembly  
28 at the first location being within a first cable channel and at least a  
29 second drive cable segment which extends from the drive drum to the  
30 slider subassembly at the second location being within a second cable  
31 channel, the first and second cable channels being formed at least in  
32 part by the lower portion of the circumferential frame member.

1 5. The multi-pane window construction for a motor vehicle in accordance with claim 4  
2 wherein the transparent pane is substantially quadrilateral, having a substantially frameless

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3 lower edge extending between first and second lower corners of the transparent pane, the lower  
4 edge being slidably received in <sup>the</sup> a laterally extending slider travel channel in the lower portion  
5 of the frame member, the first location being at the first lower corner of the transparent pane  
6 and the second location being at the second lower corner.

1 6. The multi-pane window construction for a motor vehicle in accordance with claim 5  
2 further comprising (a) a first cable fastener fixedly attached to the transparent pane at the first  
3 lower corner and to the first end of the drive cable, and (b) a second cable fastener fixedly  
4 attached to the transparent pane at the second lower corner and to the second end of the drive  
5 cable.

1 7. The multi-pane window construction for a motor vehicle in accordance with claim 6  
2 wherein at least one of the first and second cable fasteners is slidably received in the slider  
3 travel channel when the slider subassembly is between its closed and full open positions.

1 8. The multi-pane window construction for a motor vehicle in accordance with claim 7  
2 wherein the first and second cable fasteners each comprises a flange having a slot receiving the  
3 drive cable.

1 9. The multi-pane window construction for a motor vehicle in accordance with claim 5  
2 wherein the first cable channel extends laterally in the lower portion of the frame member from  
3 a first lower corner of the frame member to the slider travel channel, and the second cable

4 channel extends laterally in the lower portion of the frame member from a second lower corner  
5 of the frame member to the slider travel channel.

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1 10. The multi-pane window construction for a motor vehicle in accordance with claim 5  
2 wherein the slider subassembly is slidable in the slider travel channel between a first travel end  
3 point corresponding to the full open position and a second travel end point corresponding to the  
4 closed position, the first portion of the drive cable entering the first cable channel ~~at a first entry~~  
5 ~~point~~ proximate the first travel end point.

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1 11. The multi-pane window construction for a motor vehicle in accordance with claim 10  
2 wherein the second segment of the drive cable enters the second cable channel ~~at a second entry~~  
3 ~~point~~ proximate the second travel end point.

1 12. The multi-pane window construction for a motor vehicle in accordance with claim 10  
2 wherein the first and second cable channels and the slider travel channel together form a  
3 continuous, laterally extending channel in the lower portion of the frame member.

1 13. The multi-pane window construction for a motor vehicle in accordance with claim 12  
2 wherein the first and second cable channels each has at least a portion with a closed cross-  
3 sectional configuration within the lower portion of the frame member, and the slider travel  
4 channel has an upwardly open cross-sectional configuration.

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1 14. The multi-pane window construction for a motor vehicle in accordance with claim 13  
2 wherein the drive cable further comprises an outer conduit, the outer conduit of the first drive  
3 cable segment having a first end secured to the drive apparatus and a second end secured to the  
4 frame member at the first entry point, and the outer conduit of the second drive cable segment  
5 having a first end secured to the drive apparatus and a second end secured to the frame member  
6 at the second entry point.

1 15. The multi-pane window construction for a motor vehicle in accordance with claim 14  
2 wherein a first cable directional block is affixed to the lower portion of the frame member at  
3 the first entry point and a second cable directional block is affixed to the lower portion of the  
4 frame member at the second entry point, each of the first and second cable directional blocks  
5 comprising a socket to releasably hold a corresponding first end of the conduit and an internal  
6 passageway for guiding the drive cable toward the first and second locations, respectively.

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1 16. The multi-pane window construction for a motor vehicle in accordance with claim 14  
2 wherein said at least one fixed-position pane is mounted in the frame means laterally to the right  
3 of the slider subassembly and a second fixed-position pane is mounted in the frame means  
4 laterally to the left of the slider subassembly, a first cable directional block being affixed to the  
5 one fixed-position pane proximate the lower portion of the frame member and a second cable  
6 directional block being affixed to the second fixed-position pane proximate the lower portion  
7 of the frame member, each of the first and second cable directional blocks comprising a socket  
8 to releasably hold a corresponding second end of the conduit and an internal passageway for  
9 guiding the drive cable toward the first and second locations, respectively.

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1 The multi-pane window construction for a motor vehicle in accordance with claim 5  
2 wherein the first end and the second end of the drive cable each is bonded directly to the  
3 substantially frameless bottom edge of the transparent pane.

1 18. A method of retrofitting a manual-slide window construction installed in a motor  
2 vehicle body, the window construction comprising a circumferential frame member and a  
3 transparent pane slidably mounted in the frame member for sliding laterally back and forth  
4 between a full open position and a closed position, the transparent pane having an inside surface  
5 facing a passenger compartment of the motor vehicle body and a peripheral edge including a  
6 lower horizontal edge portion slidably received in a laterally extending slider travel channel  
7 in a horizontal lower portion of the frame member, the method comprising the following steps  
8 in any order:

9 A) attaching left and right cable fasteners to the transparent pane, each at a location  
10 laterally spaced from the other;

11 B) mounting a left conduit attachment bracket to the window construction remote  
12 from, and laterally to one side of, the transparent pane and mounting a right  
13 cable attachment bracket to the window construction remote from, and laterally  
14 to an opposite side of, the transparent pane;

15 C) mounting a drive apparatus to the motor vehicle body remote from the frame  
16 member, the drive apparatus comprising a drive motor having an output  
17 member and a drive drum operatively engaging the output member for rotation  
18 upon actuation of the drive motor; and

19 D) mounting cable means comprising drive cable extending within a conduit by (i)  
20 attaching a first end of a left portion of the conduit to the left conduit  
21 attachment bracket and attaching a corresponding first end of the drive cable  
22 to the left cable fastener, and (ii) attaching a second end of the conduit to the  
23 right conduit attachment bracket and attaching a corresponding second end of  
24 the drive cable to the right cable fastener, the transparent pane and drive cable  
25 together forming a closed loop from the drive drum.

1 19. The method of retrofitting a manual-slide window construction in accordance with  
2 claim 18 wherein the left and right conduit attachment brackets are mounted to left and right  
3 fixed panes, respectively, of the window construction on opposite sides of the transparent pane.

1 20. The method of retrofitting a manual-slide window construction in accordance with  
2 claim 18 wherein the left and right conduit attachment brackets are mounted to the lower  
3 horizontal portion of the frame member.

1 21. The method of retrofitting a manual-slide window construction in accordance with  
2 claim 18 wherein the left and right cable fasteners are at opposite ends of an elongate bracket,  
3 and are attached to the transparent pane by adhesively bonding the elongate bracket to the inside  
4 surface of the transparent pane substantially parallel the lower horizontal edge portion.

1 162. A retrofitting kit for retrofitting a manual-slide window construction installed in a motor  
2 vehicle to be power operated, the window construction comprising a circumferential frame and



3 a transparent pane slidably mounted in the frame for sliding laterally back and forth between  
4 an open position and a closed position, the transparent pane having an inside surface facing a  
5 passenger compartment of the motor vehicle body and a peripheral edge including a horizontal  
6 lower edge portion slidably received in a laterally extending slider travel channel in a lower  
7 horizontal portion of the frame, the retrofitting kit comprising:

8 left and right cable fasteners for attachment to the transparent pane, each having  
9 a slotted flange for holding a drive cable end fitting;

10 left and right conduit attachment brackets for attachment to the window  
11 construction remote from the transparent pane; *each forming a curved internal passageway*

12 drive apparatus for mounting to the motor vehicle remote from the window  
13 construction, the drive apparatus comprising a drive motor having an output member  
14 and a drive drum operatively engaging the output member for rotation upon actuation  
15 of the drive motor; and

16 drive cable in a conduit for operatively interconnecting the drive apparatus to  
17 the transparent pane for pull-pull powered opening and closing of the window  
18 construction by actuation of the drive motor for forward and reverse rotation of the  
19 drive drum, respectively, wherein (a) a first end of the conduit is attachable to the left  
20 conduit attachment bracket and a corresponding first drive cable end fitting being  
21 attachable to the left cable fastener, and (b) a second end of the conduit being attachable  
22 to the right conduit attachment bracket and a corresponding second drive cable end  
23 fitting being attachable to the right cable fastener.

1 <sup>17/</sup>23. The retrofitting kit in accordance with claim <sup>16/</sup>22 for retrofitting a manual-slide window  
2 construction installed in a motor vehicle, wherein the ~~left~~ and right conduit attachment brackets  
3 have mating stud and hole configurations ~~with the lower horizontal portion of the frame.~~

1 <sup>18/</sup>24. The retrofitting kit in accordance with claim <sup>16/</sup>22 for retrofitting a manual-slide window  
2 construction installed in a motor vehicle, wherein the left and right conduit attachment brackets  
3 are affixed to left and right fixed panes, respectively, mounted in the frame member to the left  
4 and right, respectively, of the transparent pane.

1 <sup>19/</sup>25. The retrofitting kit in accordance with claim <sup>16/</sup>22 for retrofitting a manual-slide window  
2 construction installed in a motor vehicle, wherein the left and right cable fasteners are at  
3 opposite ends of an elongate bracket having an adhesive surface covered by a removable  
4 protective film.

1 <sup>20/</sup>26. The retrofitting kit in accordance with claim <sup>16/</sup>22 for retrofitting a manual-slide window  
2 construction installed in a motor vehicle, further comprising an electrical switch suitable for  
3 mounting in the motor vehicle remote from the window construction and from the drive  
4 apparatus.

1 <sup>21/</sup>27. A window construction installed in a window opening of a motor vehicle body,  
2 comprising:  
3 a circumferential frame and a transparent pane slidably mounted in the frame  
4 for sliding laterally back and forth between an open position and a closed position, the

5 transparent pane having an inside surface facing a passenger compartment of the motor  
6 vehicle body and a peripheral edge including a horizontal lower edge portion slidingly  
7 received in a laterally extending slider travel channel in a lower horizontal portion of  
8 the frame;

9 a left conduit attachment bracket mounted to the window construction to the left  
10 of, and remote from, the transparent pane and a right conduit attachment bracket  
11 mounted to the window construction to the right of, and remote from, the transparent  
12 pane; *each conduit forming a curved internal passageway*

13 an elongate bracket adhesively bonded to an inside surface of the transparent  
14 pane substantially parallel the lower horizontal edge, having a left cable fastener at a  
15 left edge of the transparent pane and a right cable fastener at a right cable edge of the  
16 transparent pane;

17 drive apparatus mounted to the motor vehicle remote from the circumferential  
18 frame, comprising a drive motor having an output member and a drive drum operatively  
19 engaging the output member for rotation upon actuation of the drive motor; and

20 drive cable in a conduit operatively interconnecting the drive apparatus to the  
21 transparent pane for pull-pull powered opening and closing of the window construction  
22 by actuation of the drive motor for forward and reverse rotation of the drive drum,  
23 respectively, the first end of the conduit being attached to the left conduit attachment  
24 bracket and a second end of the conduit being attached to the right conduit attachment  
25 bracket, a first end of the drive cable being attached to the left cable fastener and a  
26 second end of the drive cable being attached to the right cable fastener, the drive cable  
27 and transparent pane together forming a closed loop from the drive drum.

1 ~~22~~ 28. The window construction in accordance with claim ~~21~~ installed in a motor vehicle,  
2 wherein the left and right conduit attachment brackets and the lower horizontal portion of the  
3 frame having mating stud and hole configurations.

1 ~~23~~ 29. A window construction in accordance with claim ~~21~~ installed in a motor vehicle,  
2 wherein the left and right conduit attachment brackets are affixed to left and right fixed panes,  
3 respectively, mounted in the frame member to the left and right, respectively, of the transparent  
4 pane.

1 ~~24~~ 30. The window construction in accordance with claim ~~21~~ installed in a motor vehicle,  
2 further comprising an electrical switch suitable for mounting in the motor vehicle remote from  
3 the circumferential frame member and from the drive apparatus.

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